In the Claims

1. (presently amended) An accelerometer, comprising:

a monocrystalline silicon wafer etched to form a fixed portion, a movable portion, and a resilient coupling between, the fixed and movable portions generally arranged in the plane of the wafer, the mass of the movable portion being concentrated on one side of the resilient coupling;

one of the fixed and moveable portions of the silicon structure including a first electrode oriented parallel to an axis of acceleration, the other of the fixed and moveable portions including a second electrode oriented parallel to the axis of acceleration, the other of the fixed and moveable portions bearingcomprising a metalan electrically conductive layer mechanically coupled with the second electrode and electrically connected as a third electrode coplanar with the second electrode, the second and third electrodes being stacked in a direction parallel to the an axis of acceleration and arranged in capacitive opposition to the first electrode;

a resilient coupling designed to retain the first and third electrodes in capacitive opposition to each other across a capacitance gap while allowing motion of the first electrode relative to the second and third electrodes in response to acceleration along an axis of acceleration perpendicular to the plane of the wafer, and to resiliently restore the first electrode to an equilibrium position relative to the second and third electrodes when the acceleration ceases, the second electrode being in opposition to a majority of the surface area of the first electrode when the electrodes are in the equilibrium positionthe first and second electrodes being arranged in direct capacitive opposition and the first and third electrodes being arranged in indirect capacitive opposition, the capacitance gap being oriented parallel to the axis of acceleration, the capacitance between the first electrode and third electrode increasing as the movable portion moves away from the equilibrium position in a direction along the axis of

acceleration and decreasing as the movable portion moves in an opposite direction away from the equilibrium position; and

electronics and/or software designed to translate a measurement of capacitance between the first and third electrodes into a measurement of acceleration along the axis of acceleration.

2. (presently amended) An accelerometer, comprising:

a fixed-first structure and a movable-second structure, the fixed-first and movable-second structures generally arranged in a plane, the fixed-first structure bearingcomprising a fixed-first electrode, the movable-second structure bearingcomprising a movable-second and third electrodeselectrode, the second and third electrodes being mechanically coupled and stacked in a direction parallel to an axis of acceleration perpendicular to the plane and arranged in capacitive opposition to the first electrode, wherein the first and second electrodes are arranged in direct capacitive opposition and the first and third electrodes are arranged in indirect opposition;

a resilient coupling designed to retain the first fixed-and second movable-structures in capacitive opposition to each other across a capacitance gap while allowing motion of the second and third movable-electrode-electrodes relative to the first fixed-electrode in response to acceleration along an-the axis of acceleration-perpendicular to the plane, and to resiliently restore the two-electrodes to an equilibrium position when the acceleration ceases; and

electronics and/or software designed to translate a measurement of capacitance between the first fixed-and third movable-electrodes into a measurement of the acceleration along the axis.

3. (presently amended) The accelerometer of claim 2, wherein the fixed-first structure, movable-second structure and resilient coupling are formed primarily of silicon.

4. (presently amended) The accelerometer of claim 3, wherein the fixed-first structure and movable-second structure are formed at least primarily of high aspect ratio beams each having a larger cross-sectional dimension thereof oriented parallel to the axis of acceleration.

5. (presently amended) The accelerometer of claim 3, wherein one of the fixed-first and movable-second electrodes is-are formed of silicon, being a first electrode, and the other-third electrode is formed as an electrically-conductivea metal layer on the second structure-being a second electrode.

6. (canceled)

7. (presently amended) The accelerometer of claim 65, wherein the third-second electrode is connected to a ground potential.

8. (previously presented) The accelerometer of claim 5, wherein the first electrode structure is formed as a high-aspect-ratio beam with a larger cross-sectional dimension of the beam oriented parallel to the axis of acceleration.

9. (presently amended) The accelerometer of claim 3, wherein:

a silicon wafer is etched to form the fixed-first structure and the movable-second structure.

10. (presently amended) The accelerometer of claim 9, wherein:

various structures-portions of the movable-second and fixed-first structures are electrically isolated from each other by isolation joints formed within the silicon wafer.

11. (previously presented) The accelerometer of claim 9, wherein:

various structures etched from the wafer are released from an underlying substrate of the silicon wafer.

12. (previously presented) The accelerometer of claim 2, wherein:

the electronics and/or software measure differential capacitance between at least two

pairs of electrodes, and translate the measured differential capacitance into an expression of

acceleration.

13. (presently amended) The accelerometer of claim 2, wherein:

a capacitance between the ~~fixed~~ first and ~~movable~~ third electrode is at a maximum when

the ~~movable~~ third electrode ~~structure~~ is displaced from the equilibrium position.

14. (previously presented) The accelerometer of claim 2, wherein:

the resilient coupling is a torsional flexure.

15. (presently amended) The accelerometer of claim ~~14~~9, wherein:

the resilient coupling is integrally etched from the silicon wafer with the ~~fixed~~ first and

~~movable~~ second structures.

16. (presently amended) The accelerometer of claim 2, further comprising:

~~fixed~~ first, second, and third ~~movable~~ electrodes arranged in first and second regions,

such that

motion in a direction ~~of the movable structure~~ perpendicular to the plane results in

increased capacitance between electrodes in the first region and decreased capacitance in the

second region; and

motion in an opposite direction ~~of the movable structure~~ results in decreased

capacitance between electrodes in the first region and increased capacitance in the second region.

17. (previously presented) The accelerometer of claim 2, wherein the mass of the

movable structure is concentrated on one side of the resilient coupling.

18. (presently amended) A method, comprising the steps of:

applying an acceleration to a fixed structure and a movable structure, the fixed and

movable structures generally arranged in a plane perpendicular to an axis of the acceleration, the

fixed structure ~~bearing~~comprising a fixed electrode, the movable structure ~~bearing~~comprising a

movable electrode and a shield electrode, the movable and shield electrodes being mechanically

coupled and stacked in a direction parallel to the axis of acceleration and arranged in capacitive

opposition to the fixed electrode, wherein the fixed and shield electrodes are arranged in direct

capacitive opposition and the fixed and movable electrodes are arranged in indirect opposition;

in response to the acceleration, allowing motion of the movable electrode relative to the

fixed electrode, a resilient coupling retaining the fixed and movable ~~structures~~electrodes in

capacitive opposition to each other across a capacitance gap;

resiliently restoring the ~~two~~fixed and movable electrodes to an equilibrium position

when the acceleration ceases; and

measuring capacitance between the movable and fixed electrodes, and translating the

measured capacitance into an expression of the acceleration.

19. (presently amended) The method of claim 18, wherein:

~~one of~~the fixed and ~~moveable~~shield electrodes ~~is~~are formed of silicon, and the ~~other of~~

~~the fixed and~~moveable ~~electrodes~~electrode is formed as an electrically-conductive layer

deposited on ~~a silicon~~the movable structure.

20. (presently amended) The method of claim 18, wherein:

electrodes of movable and fixed ~~portions~~structures of the accelerometer are arranged in

first and second regions, such that

motion in a direction of the movable ~~portion~~ structure results in increased capacitance between electrodes in the first region and decreased capacitance in the second region; and

motion in an opposite direction of the movable ~~portion~~ structure results in decreased capacitance between electrodes in the first region and increased capacitance in the second region.

21. (previously presented) The method of claim 18, wherein:

the resilient coupling is a torsional flexure.

22. (presently amended) An accelerometer, comprising:

a fixed portion and a movable portion, the fixed and movable portions generally arranged in a plane;

a resilient coupling designed to allow motion of the movable portion relative to the fixed portion in response to acceleration along an axis of acceleration perpendicular to the plane and to resiliently restore the ~~two~~ fixed and movable portions to an equilibrium position when the acceleration ceases;

one of the fixed and moveable portions being electrically connected as a first electrode, the other of the fixed and moveable portions ~~bearing~~ comprising an electrically-conductive layer electrically connected as a second electrode, the first and second electrodes being arranged in capacitive opposition to each other;

electronics and/or software designed to translate a measurement of capacitance between the first and second electrodes into a measurement of acceleration along the axis.

23. (previously presented) The accelerometer of claim 22:

wherein a silicon wafer is etched to form the fixed portion and the movable portion.

24. (previously presented) The accelerometer of claim 23, wherein:

the mass of the movable portion is concentrated on one side of the resilient coupling.

25. (previously presented) The accelerometer of claim 23, wherein:

the resilient coupling is integrally etched from the silicon wafer with the fixed and
movable portions.

26. (previously presented) The accelerometer of claim 23, wherein:

a substantial portion of the movable portion is manufactured by a process including a step
of releasing the movable portion from an underlying substrate of the wafer.

27. (previously presented) The accelerometer of claim 23, wherein:

various portions of the movable and fixed portions are electrically isolated from each
other by isolation joints formed within the silicon wafer.

28. (presently amended) The accelerometer of claim 23, wherein:

wherein the second electrode is formed as a layer mechanically coupled with and
electrically isolated from the silicon of the movable portion.

29. (previously presented) The accelerometer of claim 22, wherein:

the resilient coupling is formed from a solid of high modulus of elasticity.

30. (previously presented) The accelerometer of claim 22, wherein:

the resilient coupling is a torsional flexure.

31. (previously presented) The accelerometer of claim 22, wherein:

the movable portion includes a stop designed to engage a floor of the fixed portion to
limit excess motion.

32. (previously presented) The accelerometer of claim 22, wherein:

electrodes of the movable and fixed portions are arranged in first and second regions, such that:

motion in a direction of the movable portion results in increased capacitance between electrodes in the first region and decreased capacitance in the second region; and

motion in an opposite direction of the movable portion results in decreased capacitance between electrodes in the first region and increased capacitance in the second region.

33. (presently amended) The accelerometer of claim 22, wherein:

the capacitance between the first electrode and second electrode ~~increasing~~ increases as the movable portion moves away from the equilibrium position in a direction along the axis of acceleration and ~~decreasing~~ decreases as the movable portion moves in an opposite direction.

34. (presently amended) A method, comprising the steps of:

establishing an electric field between a movable electrode and a fixed electrode of an accelerometer, the movable and fixed electrodes being arranged in capacitive opposition to each other, one of the fixed and moveable electrodes being formed of silicon, the other of the fixed and moveable electrodes being formed as an electrically-conductive layer mechanically coupled with and electrically isolated from a silicon structure and stacked with the silicon structure in a direction of an axis of acceleration, ~~the silicon structure being generally coplanar with the electrode formed of silicon~~;

allowing motion of the movable electrode relative to the fixed electrode in response to an acceleration along the axis of acceleration, and allowing a resilient coupling to restore the ~~two~~ fixed and movable electrodes to an equilibrium position when the acceleration ceases;

measuring capacitance between the movable and fixed electrodes, and translating the measured capacitance into an expression of the acceleration.

35. (previously presented) The method of claim 34, wherein:

the electrode formed of silicon is a first silicon electrode; and

the silicon structure on which the conductive-layer electrode is formed is electrically connected as a second silicon electrode, the conductive-layer electrode and second silicon electrode being arranged in capacitive opposition to the first silicon electrode, the second silicon electrode being in opposition to a majority of the surface area of the first silicon electrode when the electrodes are in the equilibrium position.

36. (presently amended) The method of claim 34, wherein:

the ~~predominant structural members~~silicon structure and one of the fixed and movable electrodes of the accelerometer are formed by etching a silicon wafer.

37. (previously presented) The method of claim 36, wherein:

the resilient coupling is integrally etched from the silicon wafer.

38. (presently amended) An accelerometer, comprising:

a silicon wafer etched to form a fixed portion, a movable portion, and a resilient coupling between, the fixed and movable portions generally arranged in a plane, the resilient coupling designed to allow motion of movable portion relative to the fixed portion perpendicular to the wafer in response to acceleration perpendicular to the wafer and to resiliently restore the ~~two~~ fixed and movable portions to an equilibrium position when the acceleration ceases, the mass of the movable portion being concentrated on one side of the resilient coupling;

the fixed portion comprising a fixed electrode and the moveable ~~portions each~~portion ~~bearing~~comprising ~~an~~a movable electrode, the electrodes being arranged in indirect capacitive opposition; and

electronics and/or software designed to translate a measurement of capacitance between the first and second electrodes into a measurement of acceleration perpendicular to the wafer.

39. (presently amended) The accelerometer of claim 38, further comprising:

a third electrode ~~coplanar with and~~ mechanically coupled to the movable electrode, the movable electrode and third ~~electrodes~~ electrode being arranged in capacitive opposition to the fixed electrode, the third electrode being in direct capacitive opposition to a majority of the surface area of the fixed electrode when the fixed electrode and movable electrode ~~electrodes~~ are in the equilibrium position.

40. (canceled)

41. (presently amended) The accelerometer of claim 38, wherein:

~~a~~ the silicon wafer is etched by a dry-etch process to form the fixed portion and the movable portion.

42. (previously presented) The accelerometer of claim 38, wherein:

electrodes of the movable and fixed portions are arranged in first and second regions, such that:

motion in a direction of the movable portion results in increased capacitance between electrodes in the first region and decreased capacitance in the second region; and

motion in an opposite direction of the movable portion results in decreased capacitance between electrodes in the first region and increased capacitance in the second region.

43. (previously presented) The accelerometer of claim 38, wherein:

the resilient coupling is integrally etched from the silicon wafer with the fixed and movable portions.

44. (previously presented) The accelerometer of claim 38, wherein:

the resilient coupling is formed from a solid of high modulus of elasticity.

45. (previously presented) The accelerometer of claim 38, wherein:

the resilient coupling is a torsional flexure.

46. (previously presented) The accelerometer of claim 38, wherein:

the movable portion includes a stop designed to engage a floor of the fixed portion to limit excess motion.

47. (previously presented) The accelerometer of claim 38, wherein:

a substantial portion of the movable portion is manufactured by a process including a step of releasing the movable portion from an underlying substrate of the wafer.

48. (presently amended) A method of detecting acceleration along an axis of acceleration, comprising the steps of:

establishing an electric field between a movable electrode and a fixed electrode of an accelerometer, the movable and fixed electrodes being arranged in capacitive opposition to each other and being mechanically borne on movable and fixed portions, respectively, of a structure etched from a silicon wafer, the fixed and movable portions generally arranged in a plane,

allowing motion perpendicular to the wafer of the movable electrode relative to the fixed electrode in response to an acceleration perpendicular to the wafer, and allowing a resilient coupling to restore the two-fixed and movable electrodes to an equilibrium position when the acceleration ceases, the mass of the movable portion being concentrated on one side of the resilient coupling; and

measuring capacitance between the movable and fixed electrodes, and translating the measured capacitance into an expression of the acceleration.

49. (presently amended) The accelerometer of claim 48, wherein:

~~limiting~~ excess motion of the movable portion <u>is limited</u> by urging a stop against a floor of the fixed portion, the stop being cantilevered <u>on an opposing side of the mass concentration relative to the resilient coupling</u> ~~from the movable portion in a direction generally opposite the direction of the concentrated mass~~.

50. (presently amended) The accelerometer of claim 48, wherein:

the capacitance between the ~~first~~ <u>fixed</u> electrode and ~~second~~ <u>movable</u> electrode increases as the movable portion moves away from the equilibrium position in a direction along the axis of acceleration and decreases as the movable portion moves in an opposite direction.

51. (presently amended) The accelerometer of claim 50, wherein:

the capacitance between the ~~first~~ <u>fixed</u> electrode and the ~~second~~ <u>movable</u> electrode reaches a maximum when the movable portion has moved from the equilibrium position by a distance of about half the depth of the fixed portion.

52. (presently amended) An accelerometer, comprising:

first, second and third electrodes, ~~the second electrode being coplanar with the third electrode,~~ the second and third electrodes being arranged in capacitive opposition to the first electrode across a capacitance gap;

a resilient coupling designed to allow motion of the first electrode relative to the second and third electrodes along the axis of acceleration in response to acceleration and to resiliently restore the first electrode to an equilibrium position when the acceleration ceases, the second electrode being in opposition to a majority of the surface area of the first electrode when the ~~electrodes~~ <u>first, second, and third electrodes</u> are in the equilibrium position; and

electronics and/or software designed to translate a measurement of capacitance between the first and third electrodes into a measurement of acceleration along the axis.

53. (previously presented) The accelerometer of claim 52:

wherein a silicon wafer is etched to form the first and second electrodes; and

the axis of acceleration is perpendicular to the wafer.

54. (presently amended) The accelerometer of claim 53, wherein the third electrode is formed as an electrically-conductive layer mechanically coupled to the silicon of wafer etched to form the second electrode.

55. (previously presented) The accelerometer of claim 53, wherein:

the capacitance between the first electrode and third electrode increases as the movable portion moves away from the equilibrium position in a direction along the axis of acceleration and decreases as the movable portion moves in an opposite direction.

56. (presently amended) The accelerometer of claim 53, wherein:

the third electrode is formed as a layer of electrically-conductive material that is mechanically coupled with and electrically isolated from the silicon wafer of etched to form the movable portion.

57. (presently amended) The accelerometer of claim 53, wherein:

various structures etched from the wafer are electrically isolated from each other by isolation joints formed within the silicon wafer.

58. (previously presented) The accelerometer of claim 53, wherein:

various structures etched from the wafer are released from an underlying substrate of the silicon wafer.

59. (previously presented) The accelerometer of claim 52, wherein:

the second electrode is electrically connected to consume field lines from the capacitance gap.

60. (presently amended) A method, comprising the steps of:

establishing an electric field between first, second and third electrodes of an accelerometer, the second and third electrodes being arranged in capacitive opposition to the first electrode, the first, second and third electrodes being mechanically borne on movable and fixed portions of an accelerometer, the second and third electrodes being mechanically coupled and generally coplanar with each other;

allowing motion, perpendicular to the plane generally containing the second and third electrodes, of the movable portion relative to the fixed portion in response to an acceleration, and allowing a resilient coupling to restore the electrodes first, second, and third electrodes to an equilibrium position when the acceleration ceases, the second electrode being in opposition to a majority of the surface area of the first electrode when the first, second, and third electrodes are in the equilibrium position; and

measuring capacitance between the first and third electrodes, and translating the measured capacitance into an expression of the acceleration.

61. (previously presented) The method of claim 60, wherein:

the fixed portion and the movable portion are etched from a silicon wafer.

62. (previously presented) The method of claim 61, wherein:

the first and second electrodes are etched out of silicon.

63. (presently amended) The method of claim 61 62, wherein:

the third electrode is formed as a layer of electrically-conductive material that is mechanically coupled with and electrically isolated from the silicon of etched to form the movable portion.

64. (previously presented) The method of claim 63, wherein:

the first and third electrodes are arranged relative to each other so that motion of the movable portion away from the equilibrium position in one direction increases capacitance between the first and third electrodes, and motion in an opposite direction from the equilibrium position decreases capacitance between the first and third electrodes.

65. (previously presented) The method of claim 60, further comprising the steps of:

measuring differential capacitance between at least two pairs of electrodes; and

translating the measured differential capacitance into an expression of acceleration.

66. (previously presented) The method of claim 60, wherein:

the mass of the movable portion is concentrated on one side of the resilient coupling.